

CLAIMS:

We claim:

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1. A system of pumps, lines, and valves that circulate fluid outside a patient's body during a surgery, comprising:

a pump which draws fluid from the patient using suction;

10 a valve disposed in a first line connecting the pump and the patient, the first line having a first end being disposed inside the patient and a second end connected to the pump;

wherein when the first line experiences a predetermined amount of negative pressure, the valve allows fluid to flow from a source other than the patient toward the pump without introducing air into the first line.

15 2. The system of Claim 1, wherein the valve allows fluid to flow from a source other than the patient toward the pump via a second line connecting to the first line at the valve.

3. The system of Claim 1, wherein the valve presents a visual indicator when it allows fluid to flow from a source other than the patient into the first line.

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4. The system of Claim 1, wherein the valve relieves positive pressure in the first line.

5. The system of Claim 1, wherein the valve prevents flow from the pump to the patient.

25 6. The system of Claim 1, wherein the predetermined level is adjustable.

7. A valve for controlling pressure of fluid in a line of an extracorporeal circuit during heart surgery, comprising:

a first inlet having an axis parallel to the direction of fluid flow through the first inlet;

a second inlet having an axis parallel to the direction of fluid flow through the second

5 inlet;

an outlet having an axis parallel to the direction of fluid flow through the outlet;

wherein the first inlet allows fluid suctioned from a patient's body to pass into the valve toward the outlet, but does not allow fluid flow in the reverse direction;

wherein the second inlet allows fluid to pass from a source into the valve toward the

10 outlet in the event that negative pressure in the line reaches a predetermined level; and

wherein the axis of the first inlet and the axis of the second inlet have an angle between them less than ninety degrees.

8. The valve of Claim 7, wherein the second inlet relieves negative and positive pressure in
15 the line without introducing air into the line.

9. The valve of Claim 7, wherein the valve presents a visual indicator when it allows fluid to flow from a source other than the patient into the first line.

20 10. The valve of Claim 7, wherein the second inlet allows fluid to pass from the line to the source in the event that positive pressure in the line reaches a predetermined level.

11. The valve of Claim 10, wherein the predetermined level is adjustable.

12. An extracorporeal circuit, comprising:

a pump in fluid communication with a first line, the first line being positioned to draw fluid from a patient;

a valve system in the first line between the pump and the patient, the valve system having

a first valve which prevents flow of fluid from the pump toward the patient and a second valve which allows fluid to pass through the second valve toward the pump when negative pressure in the first line exceeds a predetermined amount;

wherein the valve system provides for relief of excess positive pressure in the first line;

and

wherein the valve system relieves negative pressure by allowing fluid flow from the first source to the first line.

13. The circuit of Claim 12, wherein the valve system relieves negative pressure in the first line without introducing air into the circuit.

14. The circuit of Claim 12, wherein the valve system presents a visual indicator when it allows fluid to flow from a source other than the patient into the first line.

15. The circuit of Claim 12, wherein the valve system relieves positive pressure by allowing fluid flow from the first line toward a first source.

16. The circuit of Claim 12, wherein the predetermined amount is adjustable.

17. The circuit of Claim 12, wherein no valve in the circuit introduces air into the circuit.